Hall Ticket Number :										

R-20

Code: 20A463T

III B.Tech. II Semester Supplementary Examinations Nov/Dec 2023

Digital Signal Processing

(Electronics and Communication Engineering)

Max. Marks: 70 Time: 3 Hours

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Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. In Part-A, each question carries **Two marks.**
3. Answer **ALL** the questions in **Part-A** and **Part-B**

PART-A

(Compulsory question)

1. Answer ***all*** the following short answer questions (5 X 2 = 10M) CO BL

a) Determine the stability and causality of the system with $h[n] = \left(\frac{1}{2}\right)^n u(n)$ CO1 L2

b) Differentiate between Decimation-in-time and Decimation-in-frequency CO1 L2

c) Draw the parallel form structure of IIR filter. CO2 L1

d) What is Multirate signal processing? CO3 L1

e) Define compression. CO4 L2

PART-B

Answer *five* questions by choosing one question from each unit (5 x 12 = 60 Marks)

Marks CO BL

UNIT–I

2. a) Check the following system described with difference equations for linearity, shift invariance, memory and causality;

$y[n] - y[n-1] = x[n]$. 6M CO1 L2

b) Determine the impulse response for the cascade of two LTI systems having impulse responses

$h_1[n] = \left(\frac{1}{2}\right)^n u[n]$ and $h_2[n] = \left(\frac{1}{4}\right)^n u[n]$. 6M CO1 L3

OR

3. a) Define DFT and IDFT. State any Four properties of DFT. 6M CO1 L2

b) Find the IDFT of the sequence X(K) = {2, 2-3j, 4, 2+3j}. 6M CO1 L2

UNIT–II

4. Compute the eight-point DFT of the sequence by using DIF FFT algorithm.

$$x(n) = \begin{cases} 1, & 0 \le n \le 7 \\ 0, & otherwise \end{cases}$$

12M CO1 L3

OR

5.		Draw the radix–2, 8–point DIT FFT flow graph obtained by the DFT sequence; x[n] = {1, 1,1,1,1,1,1,1}.	12M	CO1	L3

UNIT–III

6.	a)	Using Bilinear transformation, design a high pass filter, monotonic in pass band with cutoff frequency of 1000 Hz and down 10dB at 350 Hz. The sampling frequency is 5000 Hz.	6M	CO2	L2
	b)	Explain the procedure for designing Analog filters using the Chebyshev approximation.	6M	CO2	L2

OR

7.	a)	Design an FIR linear-phase, digital filter approximating the ideal frequency response Hd (ω) = 1 for $\|\omega\| \leq \pi/6$; 0 for $\pi/6 < \|\omega\| \leq \pi$, using a Hamming window.	6M	CO2	L3
	b)	Design a FIR digital low-pass filter with a cutoff frequency of 1 kHz and a sampling rate of 4 kHz with 7 samples using Fourier series method	6M	CO2	L3

UNIT–IV

8.		Explain about sampling rate conversion by a rational factor I/D.	12M	CO3	L2

OR

9.		Discuss about multistage implementation of sampling rate conversion.	12M	CO3	L2

UNIT–V

10.		Explain about Spectral analysis of non-stationary Signals.	12M	CO4	L2

OR

11.	a)	Explain sub-band coding of speech signals in detail.	6M	CO4	L2
	b)	Explain over sampling A/D and D/A conversion.	6M	CO4	L2

*** End ***

Hall Ticket Number :										

R-20

Code: 20A461T

III B.Tech. II Semester Supplementary Examinations Nov/Dec 2023

Embedded Systems

(Electronics and Communication Engineering)

Max. Marks: 70 Time: 3 Hours

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Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. In Part-A, each question carries **Two marks.**
3. Answer **ALL** the questions in **Part-A** and **Part-B**

PART-A

(Compulsory question)

1. Answer *all* the following short answer questions (5 X 2 = 10M)	**CO**	**BL**
a) What is memory segmentation?	1	1
b) List the applications of microcontroller.	2	1
c) Give few examples of embedded systems.	3	1
d) Define UART?	4	1
e) List the features of RTOS.	5	1

PART-B

Answer *five* questions by choosing one question from each unit (5 x 12 = 60 Marks)

		Marks	CO	BL
	UNIT–I			
2. a)	Explain about the Timers of 8051 with its Modes of Operation, and the Registers used for 8051 Timers	6M	1	2
b)	Draw and explain the internal architecture of 8051 family microcontroller and explain each block of it.	6M	1	4
	OR			
3. a)	What are the interrupts available in 8051? Explain about the Interrupt Structure.	6M	1	2
b)	Explain about the Serial data communication of 8051 with its registers. Also explain about the Modes of operation of the same.	6M	1	2
	UNIT–II			
4. a)	Explain the LCD interfacing with 8051 microcontroller.	6M	2	2
b)	Describe the 8051 interfacing to the Stepper motor.	6M	2	2
	OR			
5. a)	Describe the A/D conversion with 8051 microcontroller.	6M	2	2
b)	Explain the interfacing of a keyboard with 8051 microcontroller.	6M	2	2

UNIT–III

6.	a)	What is the purpose of the embedded system design process?	6M	3	1
	b)	List out various Embedded systems design challenges.	6M	3	1

OR

7.	a)	Discuss about various architecture and categories of Embedded Operating Systems.	6M	3	4
	b)	Differentiate code testing tools in embedded systems.	6M	3	2

UNIT–IV

8.	a)	What is an IEEE 1394 FireWire port used for? How does FireWire work?	6M	4	1
	b)	Compare RS232 with UART.	6M	4	2

OR

9.	a)	Write a short notes on inter-integrated controller	6M	4	1
	b)	What is the difference between WIFI and Bluetooth with example?	6M	4	1

UNIT–V

10.	a)	Briefly discuss about architecture of Kernel with block diagram	6M	5	4
	b)	Compare Embedded Operating Systems with Real Time Operating Systems.	6M	5	5

OR

11.	a)	Explain about Priority Inversion Problem with example.	6M	5	2
	b)	Discus about Interrupt Service Routines.	6M	5	4

*** End ***

Hall Ticket Number :										

R-20

Code: 20A462T

III B.Tech. II Semester Supplementary Examinations Nov/Dec 2023

Microwave Engineering

(Electronics and Communication Engineering)

Max. Marks: 70 Time: 3 Hours

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Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. In Part-A, each question carries **Two marks.**
3. Answer **ALL** the questions in **Part-A** and **Part-B**

PART-A

(Compulsory question)

1. Answer *all* the following short answer questions (5 X 2 = 10M)	**CO**	**BL**
a) Explain why TM_{01} and TM_{10} modes in a rectangular waveguide do not exist?	CO1	L2
b) Which is the dominant mode in circular waveguide? Why?	CO1	L1
c) Describe about probe and loop coupling mechanisms in rectangular cavity resonator?	CO2	L1
d) Distinguish between velocity modulation and current modulation?	CO2	L2
e) What are the precautions to be taken while setting up microwave bench for measurement of various parameters?	CO3	L1

PART-B

Answer *five* questions by choosing one question from each unit (5 x 12 = 60 Marks)

			Marks	CO	BL
		UNIT–I			
2.	a)	TEM wave cannot exist in a single conductor waveguide Justify the statement using Maxwell's equation.	6M	CO1	L4
	b)	For an air-filled copper X-brand wave guide with n dimensions 2.286 cm X 1.016 cm, determine the cut off frequency of the first four propagating modes. What is the attenuation for 2m length of the guide when operating at the frequency of 9 GHz?	6M	CO1	L3
		OR			
3.		Describe the field components of TE waves in a rectangular waveguide with necessary expression and also plot the field configurations for the TE_{10} mode	12M	CO1	L4
		UNIT–II			
4.	a)	Calculate the resonant frequency of an air filled rectangular resonator of dimensions a=3cm, b=2cm, d=4cm operating in TE_{101} mode Calculate the resonant frequency of an air-filled rectangular resonator of dimensions a = 2, b =1, and c = 3 operating in TE_{101} mode.	6M	CO1	L3
	b)	Draw the field configurations of different TM and TE modes for a circular wave guide	6M	CO1	L1
		OR			
5.		Discuss the propagation of TM waves in a circular waveguide with relevant expression for the field components	12M	CO1	L4
		UNIT–III			
6.	a)	With neat schematic, Describe the working of a Rotary Vane Attenuator?	6M	CO2	L1

b) Show that the scattering matrix for a magic Tee is given by

$$S=\frac{1}{\sqrt{2}}\begin{bmatrix}0 & 0 & 1 & 1\\ 0 & 0 & 1 & -1\\ 1 & 1 & 0 & 0\\ 1 & -1 & 0 & 0\end{bmatrix}$$ 6M CO2 L3

OR

7. a) Show that the attenuation produced by rotary vane attenuator is given by - 40 log (sinθ) 6M CO2 L4

b) Using the properties of scattering matrix of a lossless, reciprocal microwave junction, prove that for a four-port network if all the four ports are matched, the device shall be a directional coupler 6M CO2 L3

UNIT–IV

8. a) Explain the operation of a two-cavity klystron amplifier. Derive the expression for output power and efficiency. 8M CO2 L2

b) Define mode jumping? Explain the techniques to eliminate mode jumping? 4M CO2 L1

OR

9. a) Explain how the oscillations are sustained in cavity magnetron with suitable sketches 7M CO2 L2

b) A reflex klystron operates at the peak mode n = 2 with Beam voltage V_o = 300 V Beam current I_o = 10 mA Signal voltage V_1 = 20 V Determine the input power and efficiency. 5M CO2 L3

UNIT–V

10. a) Describe the basic operating mechanism of TRAPATT diode using a suitable sketch. Why is drift through this diode much slower than through a comparable IMPATT diode? 7M CO3 L2

b) Two identical 10 dB directional coupler are used to sample the reflected power in waveguide. If VSWR is 2 and the output of the coupler sampling the incident power is 2.5 mW. What will be the reflected power? 5M CO3 L3

OR

11. a) Explain the measurement of attenuation using power ratio method with a neat block diagram? 6M CO3 L1

b) A Gunn device operates in the transit time mode of 10 GHz. If it is fabricated from gallium arsenide, find length of device. Consider that Vs=10cm/s. 6M CO3 L3

*** End ***